

Claims

[c1] 1. A piezoelectric workpiece for electrically connected in an electric circuit for energy conversion between electrical and mechanical forms in a piezoelectric system, said piezoelectric workpiece comprising:
a body of piezoelectricity for implementing said energy conversion;
a plurality of function electrodes each fixedly attached to the surface of said body, said plurality of function electrodes being connected in said electric circuit for implementing said energy conversion; and at least one of said function electrodes having a shape with a contour of at least one acute angle;
and
at least an augmenting surface electrode fixedly attached to the surface of said body proximate to said acute angle, said augmenting surface electrode and said proximate function electrode thereof constituting a gross electrode substantially canceling said acute angle when connected electrically to the same electric potential.

[c2] 2. The piezoelectric workpiece of claim 1, wherein said at least one augmenting surface electrode has a shape that is substantially elongated.

[c3] 3. The piezoelectric workpiece of claim 2, wherein said at least one augmenting surface electrode of substantially elongated shape has at least one smooth edge opposite to said acute angle of said proximate function electrode.

[c4] 4. The piezoelectric workpiece of claim 1, wherein said at least one augmenting surface electrode has a shape that is substantially a closed-loop ring surrounding said proximate function electrode.

[c5] 5. The piezoelectric workpiece of claim 4, wherein said at least one augmenting surface electrode of substantially closed-loop ring has at least one smooth edge opposite to said acute angle of said proximate function electrode.

[c6] 6. A piezoelectric workpiece for electrically connected in an electric circuit for energy conversion between electrical and mechanical forms in a piezoelectric system, said piezoelectric workpiece comprising:
a body of piezoelectricity for implementing said energy conversion; and

a plurality of function electrodes each fixedly attached to the surface of said body, said plurality of function electrodes being connected in said electric circuit for implementing said energy conversion; at least one of said function electrodes having a shape with a contour of at least one acute angle; wherein at least a polarization augmenting electrode being pressed onto the surface of said body proximate to said acute angle during the fabrication of said piezoelectric workpiece;
said polarization augmenting electrode and said proximate function electrode thereof constituting a gross electrode when connected electrically together, said gross electrode substantially canceling said acute angle when paired with one of said function electrodes and connected to a polarization voltage; and
said polarization voltage polarizing electric dipoles of grain molecules of said body in between said pair during said fabrication of said piezoelectric workpiece so that the boundary region between different polarization orientation distribution regions within said piezoelectric workpiece are smoothed without any acute angle.

- [c7] 7. The piezoelectric workpiece of claim 6, wherein said at least one polarization augmenting electrode has a shape that is substantially elongated.
- [c8] 8. The piezoelectric workpiece of claim 7, wherein said at least one polarization augmenting electrode of substantially elongated shape has at least one smooth edge opposite to said acute angle of said proximate function electrode.
- [c9] 9. The piezoelectric workpiece of claim 6, wherein said at least one polarization augmenting electrode has a shape that is substantially a closed-loop ring surrounding said proximate function electrode.
- [c10] 10. The piezoelectric workpiece of claim 9, wherein said at least one polarization augmenting electrode of substantially closed-loop ring has at least one smooth edge opposite to said acute angle of said proximate function electrode.
- [c11] 11. The piezoelectric workpiece of claim 6, wherein said at least one polarization augmenting electrode is pressed onto the surface of said body only

during said fabrication and is removed after said fabrication.

[c12] 12. A method for fabricating a piezoelectric workpiece for electrically connected in an electric circuit for energy conversion between electrical and mechanical forms in a piezoelectric system, said method comprising the steps of:

- a) forming a body of piezoelectricity for implementing said energy conversion; and
- b) forming a plurality of function electrodes on the surface of said body, said plurality of function electrodes being connected in said electric circuit for implementing said energy conversion; at least one of said function electrodes having a shape with a contour of at least one acute angle;
- c) forming at least one polarization augmenting electrode on the surface of said body proximate to said acute angle, said polarization augmenting electrode and said proximate function electrode thereof constituting a gross electrode when connected electrically together; and
- d) polarizing electric dipoles of grain molecules of said body utilizing said gross electrode, said gross electrode substantially canceling said acute angle when paired with one of said function electrodes and connected to a polarization voltage for implementing said polarization; and said polarization voltage polarizing electric dipoles of grain molecules of said body in between said pair so that the boundary region between different polarization orientation distribution regions within said piezoelectric workpiece are smoothed without any acute angle.

[c13] 13. The fabricating method of claim 12, wherein said at least one polarization augmenting electrode has a shape that is substantially elongated.

[c14] 14. The fabricating method of claim 13, wherein said at least one polarization augmenting electrode of substantially elongated shape has at least one smooth edge opposite to said acute angle of said proximate function electrode.

[c15] 15. The fabricating method of claim 12, wherein said at least one polarization augmenting electrode has a shape that is substantially a closed-loop ring surrounding said proximate function electrode.

[c16] 16. The fabricating method of claim 15, wherein said at least one polarization augmenting electrode of substantially closed-loop ring has at least one smooth edge opposite to said acute angle of said proximate function electrode.

[c17] 17. A method for fabricating a piezoelectric workpiece for electrically connected in an electric circuit for energy conversion between electrical and mechanical forms in a piezoelectric system, said method comprising the steps of:
a) forming a body of piezoelectricity for implementing said energy conversion; and
b) forming a plurality of function electrodes on the surface of said body, said plurality of function electrodes being connected in said electric circuit for implementing said energy conversion; at least one of said function electrodes having a shape with a contour of at least one acute angle; and
c) polarizing electric dipoles of grain molecules of said body utilizing at least a polarization augmenting electrode pressed onto the surface of said body proximate to said acute angle; wherein
said polarization augmenting electrode and said proximate function electrode thereof constituting a gross electrode when connected electrically together, said gross electrode substantially canceling said acute angle when paired with one of said function electrodes and connected to a polarization voltage for implementing said polarization; and
said polarization voltage polarizing electric dipoles of grain molecules of said body in between said pair so that the boundary region between different polarization orientation distribution regions within said piezoelectric workpiece are smoothed without any acute angle.

[c18] 18. The fabricating method of claim 17, wherein said at least one polarization augmenting electrode has a shape that is substantially elongated.

[c19] 19. The fabricating method of claim 18, wherein said at least one polarization augmenting electrode of substantially elongated shape has at least one smooth edge opposite to said acute angle of said proximate function electrode.

[c20] 20. The fabricating method of claim 17, wherein said at least one polarization augmenting electrode has a shape that is substantially a closed-loop ring

surrounding said proximate function electrode.

- [c21] 21. The fabricating method of claim 20, wherein said at least one polarization augmenting electrode of substantially closed-loop ring has at least one smooth edge opposite to said acute angle of said proximate function electrode.
- [c22] 22. The fabricating method of claim 17, wherein said at least one polarization augmenting electrode is pressed onto the surface of said body only during said fabrication and is removed after said fabrication.